BREATHING AND EXERCISE

Purpose
To observe and record how breathing changes with physical activity.

Background
Air is essential to life. Humans and other animals use the oxygen they breathe along with the food they eat to produce energy. Increased physical activity raises the body's energy demand, increasing consumption of oxygen and nutrients. When we exert ourselves we notice an increase in breath rate. This is our respiratory system's response to increased energy demand.

More air flowing in and out of our lungs increases our exposure to air pollution. As a result, active children, adults, and athletes are more vulnerable to the unhealthy impacts of air pollution. During episodes of unhealthy levels of air pollution, public health officials advise reducing vigorous outdoor activities (e.g., soccer, running).

Materials
- Stopwatch, watch, clock, or timer
- Worksheet to record and chart data (included)

What to Do
1. Have students form research teams of 2-3 persons. In the 2-person groups, one student will time and record data while the other student will be the research subject. In the 3-person groups, one student will time, one will record data, and the last will be the research subject. Each team member takes a turn as the research subject. The teacher or a student can be the timer for the whole class if there are not enough watches for each group.

2. Hand out a stopwatch and Worksheet to each team. Each team will write their prediction on the Worksheet, answering the question, "Does a person breathe more or less during exercise?"

3. Breathing at Rest. The subject is sitting down. The timer/recorder will give the subject the following instructions. "When I say start, begin counting your breaths. Breathe normally." The timer tells the subject to start. After 1 minute, the timer asks the subject how many breaths he or she has taken. The timer records the number on the Worksheet under the subject's name.

4. Breathing during Exercise. The timer/recorder tells the subject, "When I say start, begin jumping up and down. After 15 seconds, I will say stop. Stop jumping and immediately start counting your breaths." The timer tells the subject to start. After 15 seconds, the timer tells the subject to stop jumping. After an additional 15 seconds, the timer asks the subject for a breath count. The recorder writes the number of breaths on the worksheet and multiplies it by 4. The timer asks the subject, "Were your breaths deeper while your exercised?" The recorder writes down the answer.

5. Repeat Steps 3 and 4 until each team member has been the subject.

6. Comparing results. Have each team make a chart or graph showing the results of their research. One member of the team presents their prediction and results to the class. Discuss the variety of results. What other variables could cause widely varying results (physical condition, respiratory illness such as asthma). How could the results for the whole class could be shown?

ACTIVITY WORKSHEET – BREATHING AND EXERCISE

I. Prediction: "Does a person breathe more or less during exercise such as jumping up and down?"

How much more or less? _____

A. Subject A: _____ (name)

Breaths in one minute at rest _____

Breaths after 15 seconds of exercise _____ x 4 = _____

Is the breathing deeper after jumping? _____

B. Subject B: _____ (name)

Breaths during one minute at rest _____

Breaths after 15 seconds of exercise _____ x 4 = _____

Is the breathing deeper after jumping? _____

C. Subject C: _____ (name)

Breaths in one minute at rest _____

Breaths after 15 seconds of exercise _____ x 4 = _____

Is the breathing deeper after jumping? _____

D. Present your results as a chart or graph: